far to the east as the river Amberno, in fact to the north-east corner of Geelvinks Bay, and then shipped to the south-west, along the coast, landing and hunting from time to time, and trying to find a favourable place for a longer stay, and a spot from which it would be possible for me to penetrate into the interior, or to cross the island.

I did not succeed till I reached the south point of the bay. Here I found a little tribe of Papooas, who treated me from the beginning to the end in the most friendly way. On this account, and because I enjoyed a very favourable hunting-ground (immediately after going ashore I got four different species of birds of Paradise), I remained here for some weeks. Shortly after having anchored, even the young girls came on board the ship together with the men, and remained there for hours, whereas, in other parts, the women generally are very shy and keep aloof.

Seeing that I could trust the natives here, I tried to carry out my project of crossing the country to the coast opposite the Aru Islands. But even if I had not come so far, for reasons which it would be out of place to give in this brief account of my journey, I got some interesting additions to our geographical knowledge,* and was very much satisfied with my zoological collections.

But I would not give up my plan of crossing New Guinea, and therefore proceeded near the coast to the north-west, looking out everywhere for a convenient starting-point, and gathering every possible information from the natives. But the island was still too broad here; the Papooas knew nothing of the opposite coast, as they do not migrate so far.

The natives of these western coasts of Geelvinks Bay are all afraid of the Wandamman tribes, whereas those of the eastern coasts are afraid of the Waropin tribes; but generally the vast country here is very poorly populated, there being few settlements, and these few small ones.

The point where I crossed the island at last into MacCluer Gulf of the south-west coast was situated 134° 18′ E., 20° 38′ S. I went first to the north-west, and then, after having passed several mountain chains (2,000 ft.), to the west, down a fine river called the Jakati, through the country of Onim. It was, perhaps, lucky for me that I could only get a very small native prau here, else I would have proceeded farther west by sea, (the swamps render it impossible to go by land), and possibly encountered dangers from the natives of the MacCluer Gulf, who have not the best reputation, and who certainly would have felt inclined to revenge their countrymen, killed by the Italian Cerruti and his company, some years ago.

I need not say that this journey from one side of New Guinea to the other has never been made before; and I should hardly myself attribute any importance to the fact, were it not for the reason that till then we did not know exactly whether there existed a communication by water from Geelvinks Bay to MacCluer Gulf or not. We may be convinced now that it does not exist.

From Geelvinks Bay I tried to ascend the Arfak Mountains from the south, but did not succeed, because I ran short of provisions. The country seemed uninhabited, or, without Papooan guides as I was, and with only some of my Malay companions, I missed the few native houses and small plantations in the neighbourhood, scattered here and there, so that it was not advisable to go too far into the country. Besides, I did not find in the forests on the southern slopes of the Arfak Mountains those gems of the bird-world which I hoped to find, and therefore left these regions and penetrated from the north with better success. It will be interesting for English ornithologists to learn that I succeeded in finding here (3,000—6,000 ft.) all the known Birds of Paradise of New Guinea (except the species from the islands), besides a new one, and a quantity of other most curious and rare specimens, the ornis of the mountains being quite different from that of the seashore. But here also, as on the whole of New Guinea, I was astonished to see that the fauna generally is not rich. The forms found in the country certainly are curious and characteristic, but, in comparison with the enormous mass of forest, they are everywhere very scarce, and it is an exception to find a hunting-ground where much is to be got in a short space of time. It is the same in New Guinea as I found it in Celebes, where more of the life of nature is to be seen and heard near the seashore and the settlements than in silent virgin forests.

I hope that now, since the interior of New Guinea is opened, at least as the way is known how to penetrate into one part of it, other naturalists will soon succeed in reaping more important results than it was my lot to obtain.

ADOLF BERNHARD MEYER

MICROSCOPIC PETROGRAPHY

Mikroskopische Physiographie der petrographisch wichtigen Mineralien ein Hülfsbuch, bei mikroskopischen Gesteinstudien. H. Rosenbusch. With 102 woodcuts and ten coloured plates. (Stuttgart.)

SINCE we last called attention to this subject in the columns of NATURE it has been making steady progress, chiefly among our German, that is, of course, German-speaking, brethren of the hammer and lens. The various serials which treat of Geology and Mineralogy bear witness to this progress, and to the wonderful activity of some of the workers, such as our good friends Zirkel and Tschermak, to whom it is so largely due. And now here comes a goodly octavo of some four hundred pages as a further contribution to our knowledge, and a fresh proof of the strong hold which the microscopic study of minerals and rocks has taken of the German geognostical mind. This activity need not be matter for wonder when one considers the chaos into which matters petrographical had got even in Germany. Those who studied rocks in that country had become a sort of bound thralls to chemists and chemical analysis. They dared not trust their eyes to discriminate the differences of species and varieties. The specimens must be handed over to the laboratory, and on the judgment thence obtained depended the names by which the compounds should be known thenceforward throughout Christendom. By this means, as the composition of a rock often differs considerably in different, and even in closely-adjoining, parts—variations resulting partly from original discrepancies, and partly from internal changes due to the subsequent infiltration of water or other metamorphic influences—it was not difficult to make out half-a-dozen distinct varieties of rock from the same mass and even from the same quarry. And so analysis of rocks grew and multiplied, chemists became more and more nice in their discrimination of the veriest fractions of a per cent., petrography seemed in a fair way of being annexed as a dependent province of chemistry, and the petrographers, who ought to have been geologists, and to have set themselves strenuously to find out what had been the history of the rocks as parts of the architecture of the globe, came gradually to accustom themselves to the notion that, after all, it was really true that rocks were merely so many chemical compounds to be analysed and labelled accordingly.

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* The geographical part of my expedition will be published very soon, accompanied by a chart, in Petermann's *Mittheilungen*.

In the midst of the darkness wherein the poor petrographers ticketed their specimens, carefully arranged their cabinets, and elaborated their dreary treatises, there fell among them (not from heaven, but from the hands of a worthy citizen of Sheffield) a microscope and a few glass slides, with a description of what could be done therewith. Eyes which had seen no light for so long could not at first make anything of the apparition, but after a few years it began to take shape before them; and now the microscope promises to do as much in comparison for mineralogy and petrography as it has done for the biological sciences.

From town to town this new light has spread, or rather rushed, all over Germany. There is now a sort of neck-and-neck race who will make the most slices of rocks and minerals. A cutting or rubbing-machine and a microscope have become as necessary implements as a hammer or a lens. Every month brings to light some new "mikromineralogische" contribution, insomuch that if the fever lasts we shall ere long be as over-weighted with microscopic analysis as we used to be with chemical. Both are excellent and necessary, and yet we may be allowed to believe that neither singly nor together do they disclose to us anything like the whole history of the rocks, and that they cannot by themselves yield a sufficiently broad foundation for a truly philosophical classification in petrography.

The advantages of microscopic analysis applied to rocks are so many and obvious that we cannot be surprised that they should have been so widely recognised and put in practice. This method of investigation throws a direct light upon the construction of rocks in a way which chemical analysis can never do. Moreover, it is easily adopted. Anybody can make microscopic sections, and with due care and experience may become a skilful analyst. And then this mode of research is so cheap. Even if the observer does not care to give the trouble and time necessary for the construction of his own sections, he can get them made for him at small cost. And once in possession of them and his microscope, he obtains his results at once. No need to wait for days upon a solution, or to weigh and re-weigh his precipitates.

It is plain that as rocks are composed of aggregates of minerals in many various combinations, the first preliminary step in our investigation of their minute structure should be devoted to the study of the microscopic character of the minerals which compose them. We must know how these minerals are built up in themselves before we can adequately comprehend the manner in which they are mingled together to form rocks. Besides, in a crystalline rock, such, for example, as basalt, the component minerals are crystallised on so minute a scale, and often so imperfectly, that their ordinary and characteristic peculiarities may be so veiled that, unless from previous experience, we could not with certainty recognise them. Hence every student who sets himself, microscope in hand, to find out how the materials of the rocky crust of the earth have been put together, ought unquestionably to begin the search by accustoming his eye to the variations which the simple minerals present when viewed in different positions under a strong magnifying power. It will not be necessary for him to cut slices of every known mineral. He will have done enough for his immediate purpose if he has sliced in all directions, and examined with polariscope and otherwise the comparatively few simple minerals which are of prime importance, as those of which most of the visible rocks of the globe have been formed.

A text-book which will guide him in this most interesting and important research has never hitherto appeared. Descriptions of the methods to be employed in the preparation of translucent sections have been published both in this country and in Germany. Indeed, it was Nicol, of Edinburgh, who, besides giving us the prism named after him, invented and made known more than forty years ago this most ingenious method of investigation. Abundant notices have also been published during the last dozen years, chiefly in Germany, regarding the microscopic characters of many minerals and rocks, so that a student who had time and opportunity to consult this very scattered literature, might gain amply sufficient knowledge to start him in his research. But none the less has a general text-book been required to save such needless expenditure of time, and to give the student those practical hints which he is not likely to meet with in mere scientific communications on special subjects. It is this want which Mr. Rosenbusch endeavours to supply in the volume now before us.

From his preface we gather that living at Freiburg he caught the microscopic fever, and has had it for a number of years. Anxious to communicate the infection as safely and effectually as possible to the younger mineralogists, he has compiled a text-book which ought to serve its purpose well. It is well arranged, neatly printed, excellently illustrated, and cheap. After some introductory pages which skim over the history of his subject, the author proceeds, in the first or general part of his treatise, to give the student directions how to cut and prepare his slices of mineral or rock for microscopic examination. Then, having the slices prepared, he shows how they are to be used, and what may be looked for in them. With characteristic German completeness he speaks of the general morphological peculiarities of minerals crystallised and amorphous, and shows how singular and varied are the anomalies in internal structure revealed by the microscope even in what seem to be the most regularly built crystals. The optical properties of minerals are discanted upon with a fulness perhaps hardly in keeping with the other parts of the book, but the importance of this branch of the subject, particularly in reference to the analysis by means of polarised light, may well be pleaded in excuse by the author. The third section of the general descrip tion of minerals deals with their chemical peculiarities. It occupies not quite four pages, and has evidently been inserted for the sake of completeness, that the learner, even though specially intent upon microscopic work, should not be left wholly in the dark as to what he can accomplish himself in the way of chemical analysis.

The second and by much the more important and useful part of the treatise deals with the microscopic characters of minerals, and more particularly of those which enter largely into the composition of crystalline rocks. Considerably over a hundred minerals are treated in this way, and these, of course, include all those which are of prime consequence to the petrographer. For example, the felspars, augite, hornblende, calcite, quartz, pyrite, and other common ingredients of rocks are fully described. The author has worked hard at the subject himself, though he has not hitherto published much. One excellent feature of his volume is the full references which he gives to the papers of previous writers on the same subject. Not only at the beginning of the description of each mineral does he quote, in legible print, the titles of the papers in which information about the microscopic characters of that mineral may be found, but at the end of the volume he inserts a long alphabetical list of authors, with the names and dates of their papers. This is a most welcome boon to all those who, especially in our own country, have the courage to attack the voluminous, but hitherto hardly known or accessible literature of the subject. Two sorts of illustrations are given—woodcuts and coloured plates. Of the former rather more than 100 occur, mostly illustrative of the crystalline forms or optical characters of the minerals. They do not call for special remark, except that they might with advantage have been more numerously inserted to explain the internal peculiarities of some of the numerous species described. The coloured plates are singularly effective. Ten in number, they contain sixty figures of the microscopic structure of upwards of thirty more or less common minerals. We have seen nothing so good since Vogelsang's large and admirable drawings published six years ago at Bonn. It appears that it was originally intended to have included more plates, but that the cost proved so great that the number had to be restricted to ten. This, no doubt, is the reason why some not very important minerals have a place on the plates, while others of greater consequence have been left out.

This volume, even had it been less painstaking than it is, would have deserved commendation as an introduction to a study for which no text-book at all previously existed. But, as its author frankly acknowledges, it will not and is not intended to supply the place of actual personal work—"he who would learn microscopic mineralogy must to the cutting-lathe and the microscope." The greater the number of observers who can be induced to betake themselves to this pursuit, the sooner may we hope for some definite and broad well-established results. At present the work accomplished, most excellent and praiseworthy though it be, belongs rather to the hewing-of-wood and drawing-of-water order. The facts are weekly accumulating out of which, in the end, a flood of light will unquestionably be cast upon the genesis of rocks, and consequently upon the history of the earth itself. All honour, therefore, to the enthusiastic workmen by whom this labour is so cheerfully and actively undertaken, and none the less to Mr. Rosenbusch for publishing a most useful volume, which will, no doubt, increase their numbers.

OUR BOOK SHELF

Solid Geometry and Conic Sections, with Appendices on Transversals, and Harmonic Division, for the Use of Schools. By J. M. Wilson, M.A. Second Edition. (Macmillan and Co., 1873.)

Elementary Geometry, Books i. ii. iii., following the "Syllabus of Geometry," prepared by the Geometrical Association. By J. M. Wilson, M.A. Third Edition. (Same publishers, 1873.)

THE portions of the title-pages we have above given sufficiently indicate the scope of the two works under review and the measure of acceptance they have met with. As we have already given an account of the former work it will not be necessary to give any detailed account of it now. It has been considerably improved by the addition of some eighteen pages of new matter, consisting of a slight rearrangement of Section I., which treats of planes, the addition of a section (IV.) on the sphere, which is almost entirely new to the work, and some slight changes in the articles on the Ellipse and Hyperbola. The result is a close approximation to the views we expressed in our previous notice, and the book can be recommended as an excellent, if not the only English, treatise suited to the requirements of candidates for the first B.A. Pass Examination of the London University. We point out an obvious slip of *inscribed* for *circumscribed* circles, on p. 55; in the fifth paragraph, p. 56, all the A's but one should be accented; the last exercise, on p. 68, is misplaced, and repeated in its proper place, as Exercise 29 on p. 71; other minor slips can be easily corrected.

The "Elementary Geometry" is to our mind a vast improvement upon the first edition; the changes are all, we believe, in the right direction. We never took kindly to that first edition; the most confirmed euclidophilist must be led by a perusal of this to a more favourable view of the aims of anti-euclidean agitators. Seeing that the aim of teachers of both parties, if they are in earnest, should be the *improvement* of geometrical teaching, we trust that neither party will lose sight of this high mark through intervening clouds of dust raised on irrelevant grounds.

The "get-up" of both books is excellent, the printing of the "Elementary Geometry" most accurate (we have detected but one or two slight errors). We wish to add a closing remark on this subject of *errata*: we consider that an author is bound to bestow every care in this matter, and it is with regret that we find some works of recent date have been brought out, it is reasonable to suppose, in such haste to meet a possible demand for them that they may be said to teem with mistakes. This entails great waste of time and trial of patience upon junior students and appears to us unfair treatment. R. T.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

The Southern Uplands of Scotland

To the able articles on this subject contributed to your pages by Prof. Harkness, I should like to be permitted to make an addition. He has referred to some opinions and observations of mine, but I am anxious that it should be generally known to what an extent the results obtained by the Geological Survey